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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/670,395	09/26/2003	Kenneth A. McQueeney	66396-098	2724

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EXAMINER

NGUYEN, HOAI AN D

ART UNIT	PAPER NUMBER
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2858

DATE MAILED: 02/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/670,395	Applicant(s) MCQUEENEY ET AL.	
	Examiner Hoai-An D. Nguyen	Art Unit 2858	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 7-9 is/are rejected.
- 7) ☒ Claim(s) 5 and 6 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>04/19/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Objections

1. Claim 9 is objected to because of the following informalities: it appears that the phrase “firing line voltage” is duplicated. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayes (US 4,602,507) in view of Jonker et al. (US 5,258,753).

Hayes teaches an apparatus for monitoring and visually displaying the operation of an internal combustion engine comprising:

With regard to claim 1:

- Consecutively disconnecting and reconnecting the primary connector for each coil that connects to a cylinder pair (From column 7, line 57 to column 8, line 2).
- When a single primary connector is disconnected, determining whether misfiring or roughness declines, thereby identifying a faulty cylinder pair (Column 3, lines 37-52).

Hayes teaches all that is claimed as discussed above, but he does not specifically teach the followings:

- For each cylinder of the identified faulty cylinder pair, measuring a firing line voltage for each accessible spark plug wire connected to the identified faulty cylinder pair.
- Identifying a faulty cylinder based on a measured abnormal firing line voltage.

However, Jonker et al. teaches a digital engine analyzer comprising:

- For each cylinder of the identified faulty cylinder pair, measuring a firing line voltage for each accessible spark plug wire connected to the identified faulty cylinder pair (Column 10, lines 21-29 and column 11, lines 44-52).
- Identifying a faulty cylinder based on a measured abnormal firing line voltage (Column 10, lines 21-29 and column 11, lines 44-52).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus for monitoring and visually displaying the operation of an internal combustion engine of Hayes to incorporate the teaching of measuring a firing line voltage for each accessible spark plug wire and identifying a faulty cylinder based on a measured abnormal firing line voltage taught by Jonker et al. since Jonker et al. teaches that such an arrangement is beneficial to provide for a continuously updated or running graphical display of the historical peak voltage data for a selected cylinder over a number of engine cycles, which can provide useful diagnostic information to determine if one or more cylinders may have faulty spark plugs as disclosed in column 3, lines 33-41.

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With regard to claim 2, Hayes discloses the engine is a four-cylinder engine (From column 7, line 57 to column 8, line 2 and column 3, lines 37-52).

With regard to claim 3, Jonker et al. also teaches determining a firing order for the cylinders of the engine and the position of the first firing cylinder; and identifying cylinder pairs based on the connection of two cylinders to the same primary connector (From column 8, line 54 to column 9, line 12 and FIG. 17).

With regard to claim 4, Hayes discloses the engine has a number of cylinders that is selected from the group consisting of four, six, eight, ten, twelve and sixteen (From column 7, line 57 to column 8, line 2 and column 3, lines 37-52).

With regard to claim 7, Jonker et al. also teaches the ignition coil is configured as a coil over plug assembly having a single accessible spark plug wire (FIG. 2, spark plugs 41).

With regard to claim 9, Jonker et al. also teaches the step of identifying a faulty cylinder based on a measured abnormal firing line voltage includes the step of displaying the abnormal firing line voltage as part of a waveform (Column 10, lines 21-29 and column 11, lines 44-52).

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hayes in view of Jonker et al. as applied to claim 1 above, and further in view of James et al. (US 5,493,496).

Hayes and Jonker et al. together teach all that is claimed as discussed in the rejection of claims 1-4, 7 and 9 above, but they do not explicitly teach the following:

- Each ignition coil of the ignition system includes two outputs, each of said outputs being connected to spark plugs for two cylinders.

However, James et al. teaches a cylinder number identification on a distributorless ignition system engine lacking CID comprising:

- With regard to claim 8, each ignition coil (FIG. 3, coil 14) of the ignition system includes two outputs (FIG. 3, ignition coil secondary outputs 38), each of said outputs being connected to spark plugs (FIG. 3, spark plugs A, B) for two cylinders (Column 3, lines 30-45 and FIGS. 1 and 3).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the apparatus for monitoring and visually displaying the operation of an internal combustion engine of Hayes and Jonker et al. to incorporate the teaching of a electronic distributorless ignition system, which can be used in the digital engine analyzer of Jonker et al. as discussed above, taught by James et al. since James et al. teaches that such an arrangement is beneficial to provide a workable method that will work when only sensing voltage drops for two cylinders, the accuracy and reliability is increased when employing the redundancy of sensing the voltage drops for each pair of cylinders, since each pair fires out of phase with one another. These separate firing events can be combined and analyzed together, thus producing usable results even if one coil or spark plug fails as disclosed in column 2, lines 49-56.

Allowable Subject Matter

5. Claims 5 and 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

- The primary reason for the indication of the allowability of claim 5 is the inclusion therein, in combination as currently claimed, of the limitation of a step of prior to the step of determining whether the misfiring or roughness declines when the primary connector is disconnected, determining whether idle speed of the vehicle is lower than fast idle speed before one of the primary connectors is disconnected, and if the idle speed is lower than fast idle speed, increasing the idle speed of the vehicle such that the idle speed of the vehicle is at fast idle speed. This limitation is found in claim 5 is neither disclosed nor taught by the prior art of record, alone or in combination.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicant's attention is invited to the followings whose inventions disclose similar devices.

- Kinder (US 4,306,187) teaches an apparatus for visually monitoring ignition voltages.
- Lill et al. (US 4,886,029) teach an ignition misfire detector.
- McCombie (US 5,574,217) teaches engine misfire detection with compensation for normal acceleration of crankshaft.
- Inagaki (US 5,617,032) teaches a misfire detecting device for internal combustion engine.

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- Carr et al. (US 5,719,330) teach an automotive ignition module diagnostic.
- Quinnett et al. (US 6,615,160) teach methods and apparatus for engine diagnostics.

CONTACT INFORMATION


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoai-An D. Nguyen whose telephone number is 571-272-2170. The examiner can normally be reached on M-F (8:00 - 5:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hoai-An D. Nguyen
Examiner
Art Unit 2858
HADN

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EDWARD LEFKOWITZ
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